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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/797,425	03/10/2004	Pradip K. Roy	TPS-008	4397

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EXAMINER

HU, SHOUXIANG

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 09/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/797,425	Applicant(s) ROY ET AL.	
	Examiner Shouxiang Hu	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 and 54-71 is/are pending in the application.
- 4a) Of the above claim(s) 4,6,7,9,10,15-24,28 and 29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5,8,11-14,25-27 and 54-71 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. According to previous office actions and the latest amendment, claims 1-29 and 54-71 are pending in this application; and claims 1-3, 5, 8, 11-14, 25-27 and 54-71 remain active in this office action.

Claim Objections

2. Claims 57, 64 and 71 are objected to because of the following informalities and/or defects:

Claims 57, 64 and 71 each recite the subject matter that the recited flow rate is varied continuously; however, it appears to lack a full support from the original disclosure. And, the last amendments fail to clarify where exactly from the original disclosure support for such subject matter can be found.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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3. Claims 1-3, 5, 12-14, 25, 54, 58-59, 61-62, 65-66 and 68-69 are rejected under 35 U.S.C. 102(b) as being anticipated by Sugiyama (Sugiyama et al., US 2002/0038898 A1).

Sugiyama discloses a method of fabricating a SiGe thin layer semiconductor structure (Figs. 1-14; also see [0057]), comprising: providing a substrate (12; Si) having a dielectric layer (14; SiO₂) thereon to a process system that naturally includes a process chamber, as it is naturally required for the formation of the other layers thereon; forming the other layers including: forming a graded SiGe layer (34; with Ge being less than 50% or 0.5) over the dielectric layer; and, forming a Si cap layer (36 and/or 40).

Regarding claims 12-14, 61-62 and 68-69, Sugiyama further disclose that all of the SiGe and Si layers can be deposited by CVD with Si₂H₆ and/or GeH₄ (see [0077] and [0078]).

Regarding claim 25, the deposition in Sugiyama further including: heating the substrate to 650 °C.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 8, 11, 26-27, 55, 60 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugiyama.

The disclosure of Sugiyama is discussed as applied to claims 1-3, 5, 12-14, 25, 54, 58-59, 61-62, 65-66 and 68-69 above.

Regarding claims 8, 60 and 67, the deposition of the variable composition SiGe layer in Sugiyama includes providing a graded Ge content, with the Ge content being about 0.3 adjacent the dielectric layer and decreasing to a lower limit of about 0.15, which is substantially close to the lower limit of 0.1 recited in the claimed invention. And, it is noted that the Ge content in the graded SiGe is an art-well-recognized parameter of importance subject to routine experimentation and optimization.

Therefore, it would be well within the ordinary skill in the art at the time the invention was made to use the method of Sugiyama for making a semiconductor device with the lower limit for Ge being about 0.1, so that a method for forming a semiconductor device with optimized depositing process would be obtained.

Regarding claims 11 and 55, Sugiyama does not expressly disclose that the process chamber can be either for a single wafer or for a batch of wafers. However, it is noted that it is art known that the depositing process can be performed in either of the two types of process chambers, depending on the considerations of the required process quality, speed, and cost.

Therefore, it would be well within the ordinary skill in the art at the time the invention was made to use the method of Sugiyama for making a semiconductor device with the forming steps being implemented in either a single-wafer chamber or a multiple-wafer chamber, so that a method for forming a semiconductor device with desired process quality, speed, and/or cost would be obtained.

Regarding claims 26 and 27, Sugiyama does not expressly disclose that the method can further comprise a step of providing a process chamber pressure of less than 100 Torr or 1 Torr. However, it is noted that it is art known that the depositing process can be performed in such recited pressure; and that the process chamber pressure is a well recognized parameter of importance subject to routine experimentation and optimization.

Therefore, it would be well within the ordinary skill in the art at the time the invention was made to use the method of Sugiyama for making a semiconductor device with the process chamber pressure once being provided at the recited pressure, so that a method for forming a semiconductor device with optimized depositing process would be obtained.

5. Claims 56-57, 63-64 and 70-71, as being best understood in view of the claim objections above, are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugiyama in view of Murthy (Murthy et al., US 2003/0157787 A1).

The disclosure of Sugiyama is discussed as applied to claims 1-3, 5, 8, 11-14, 25-27, 54-55, 58-62 and 65-69 above.

Sugiyama does not expressly disclose that the CVD depositing of the graded SiGe layer can include continuously vary the flow rate of at least one of the Si- and Ge-containing gases. However, as evidenced in Murthy (see [0021], one of ordinary skill in the art readily recognize that such graded CVD process is commonly used in the art for depositing a SiGe layer with desired composition gradient.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the graded CVD method of Murthy into the method of Sugiyama, so that a method for forming a semiconductor device with the desired composition gradient in the graded SiGe layer would be obtained.

Response to Arguments

Applicant's arguments with respect to above rejected claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shouxiang Hu whose telephone number is 571-272-1654. The examiner can normally be reached on Monday through Thursday, 7:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SH
September 7, 2006

A handwritten signature in black ink, appearing to read 'Shouxiang Hu' in a cursive style.

SHOUXIANG HU
PRIMARY EXAMINER